A Developmental Cranial Anomaly from Antiquity

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ABSTRACT

Two skull specimens datable to the Classical Age showing the presence of a rare developmental anomaly are recorded.

INTRODUCTION

The skull has a complex developmental history that is associated with its progressive modification in vertebral phylogeny and with the adaptive specialisation of many of its components. It consists of a protective case around the brain – the neurocranium; and of the jaw skeleton – the viscerocranium. The neurocranium develops from a series of cartilages ventral to the brain to form the calvarium and the facial skeleton. Ossification centres appear in these cartilaginous plates early during embryonal development and extend to form a number of bony plates separated from each other by a series of cranial sutures. At birth, ossification of the skull bones is incomplete with many consisting of several bony elements united by fibrous tissue or cartilage. Obliteration of the sutures of the vault of the skull takes place as age advances (Warwick and Williams, 1973). Alteration in the developmental process may give rise to non-pathological anomalies of cranial structure. A developmental anomaly of the cranial sutures has been previously described from a Neolithic skull excavated from the Hal Saflieni Sanctuary in Malta. This skull showed an absent sagittal suture between the parietal bones, so that the calva has only a coronal suture [Savona-Ventura and Mifsud, 1999]. A different anomaly with persistence in adult life of a cranial suture that normally fuses and disappears in childhood is herein described.

Material

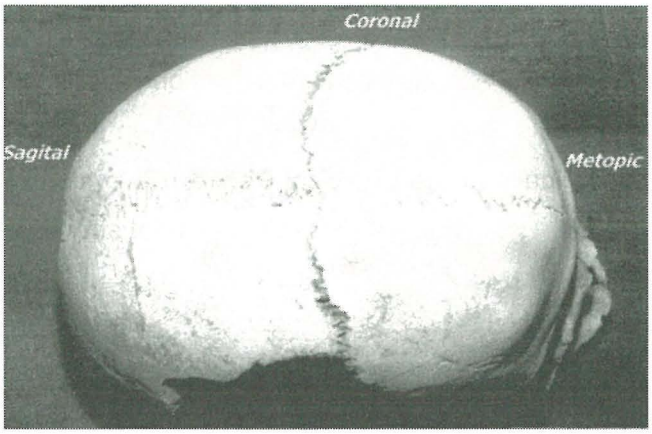
The skull remains kept at the St. Agatha Museum collection [Rabat, Malta] were examined as part of an anthro-pomorphologic study [Savona-Ventura et al, in press]. This series of 23 skulls has been dated archaeologically to the Classical Period. Two skulls [SA004 and SA008] in this collection show a rare non-pathological anomaly of cranial structure.

Description

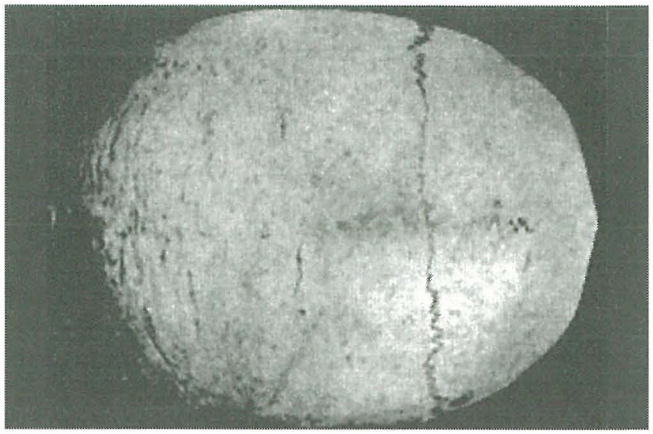
The two adult skulls [SA004 and SA008] in the series of 23 skulls datable to the Classical Age [prevalence 8.7%] are characterised by the persistence of the metopic suture. The persisting metopic suture in both specimens runs in a straight line along the whole length of the frontal bone. The smaller skull [SA004] probably belonged to a female individual, while the larger skull [SA008] belonged to a male. Both skulls are fragmented, with the larger skull [SA008] being only partially fractured only on the right side, while the smaller specimen [SA004] being more severely fractured. The anthropomorphic measurements of these two skulls are given in Table 1.

CRANIAL MEASUREMENTS	SA004 Female	SA008 Male
Glabella-occipital	169	177
Basobregmatic	-	122
Auricular length	105	113
Baso-prostion	-	95
baso-nasion	-	96
cranial breadth	131	158
frontal breadth	117	128
Bizygomatic breadth	124	144
nasal breadth	22	24
nasal height	54	50
orbital breadth	35	37
orbital height	31	31
nasio-prostion	70	70
nasio-gnathion	-	119
palatal breadth	39	44
palatal length	47	52
skull circumference	500	520
Parietal thickness	6	6
Cephalic Index	77.5	89.3
Height-Breadth Index	-	77.2
Height-Length Index	-	68.9
Total Facial Index	-	82.6
Upper Facial Index	56.5	48.6
Nasal Index	40.7	48
Orbital Index	88.6	83.8
Palatal Index	83	84.6
Gnathic Index	-	99

Table 1



Norma verticalis view of SA008



Classical Skull – Bradley Series

Discussion

The frontal bone in the adult skull is shaped like a shallow, irregular cap and forms the region of the forehead. It is ossified in fibrous tissue from two primary centres that appear in the eighth week of intrauterine life. From each of these centres ossification extends upwards to form the corresponding half of the bone. At birth the bone consists of two halves separated by the frontal or metopic suture, but union begins in the second year, and the suture is usually completely obliterated by the eight year (Warwick and Williams, 1973). In a small percentage, the two halves of the frontal bone remain separate, and the metopic suture persists in adulthood. Persistence of the metopic suture in adulthood has been associated with a degree of racial variation (Montagu, 1951; Tongerson, 1951; Berry, 1975).

The prevalence of persistence of the metopic suture has been variously estimated and shown to vary between various races from 0 – 10%. A study of 206 adult Nigerian skulls showed complete or incomplete persistence of the metopic suture in 3.4% of skulls [Ajmani et al, 1983]. A prevalence of 2.66% was reported in a series of 1,276 adult Indian skulls [Agarwal et al, 1979]. The prevalence of persistence of the metopic suture in the mongoloid race was estimated at 10% [Woo, 1949]. No information is presently available as to the prevalence of metopism in the modern Maltese population.

No mention of a persistent metopic suture is made in the detailed description of a series of six Classical Maltese skulls [Thurnam, 1870]. An anthropomorphic study carried out in Malta on a series of Classical (Phoenician) skulls kept by the Museum in 1912 similarly made no mention of the presence of any anomalies in the skulls. However one ellipsoid skull pictured in this study showed clear evidence of the presence of a partial metopic suture [Bradley, 1912]. A further anthopomorphic study of 11 Prehistoric, 23 Maltese Classical (Romano-Maltese), 463 Early Modern and 42 Recent skulls similarly failed to note the presence of a metopic suture [Dudley Buxton, 1922]. It is possible that author failed to record the variation even if it was encountered, since he also failed to record the absence of a sagittal suture in one of the Prehistoric skulls in his series [Savona-Ventura and Mifsud, 1999].

The period prevalence of persisting metopic suture during the Maltese Classical Age based on the present series approximates 8.7%. The relatively high prevalence rate in the present series suggests a racial or genetic relationship between the two specimens. One must however interpret population studies based on burial remains with caution since these are often cross-sectional and need not necessarily reflect a true population sample [Waldron, 1994].

Any population sample used in palaeoepidemiology has inherent factors that bias the randomness of the sample. The specimens recovered are only a proportion of the total dead population since a number of specimens may be lost due to poor preservation and disturbance in antiquity. At the St. Agatha catacomb complex, the minimum total number of adult inhumations recorded was 305, suggesting that the skull recovery rate was only 7.5% [Camilleri, 1984]. A further possible epidemiological source of error is the fact that a burial assemblage is a social or cultural sample, and not necessarily a biological one. Thus the burial sample may not in any way be typical of the population to which it appertained. To compound matters further for the palaeoepidemiologist, a burial population may represent individuals who had died many hundred of years apart [Waldron, 1994]. For these reasons, prevalence rates based on burial populations must be viewed and interpreted cautiously since a high prevalence rate in a particular population sample may very likely be simply due to chance.

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